EBIS Booster Penetration Fault Study at 10 MeV

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Date:_____
Fault Study No.:_____

Study Plan

1.1 Goal

The goal of this study is to produce beam loss in the LTB line close to the penetration in the linac-booster wall where LTBT line crosses the ETB (EBIS to Booster) line and measure the resulting prompt radiation on the linac side. This study is to be conducted in accordance with AGS OPM 9.1.9

1.2 Initial Conditions

1. The study is to conducted with H- ions from linac
2. The H- ion kinetic energy is 10.4 MeV (Tanks 1energy). The repetition period is at least 1 second.
3. The maximum intensity is 5 x 10^{12} H- per pulse

1.3 Method

1. The beam loss will be produce by following two methods
   (a) By inserting LTB vacuum valve ltb-sv-076. This valve is located 10 inches downstream of the point where the LTB beam centerline crosses the ETB beam centerline
   (b) By hitting beam near the LTB and ETB crossover by using dipole D2 to D5 and horizontal steerer magnet (DH76) upstream of the crossover.
2. Lock off RF system of tank2 to guarantee beam energy cannot exceed 10.5 MeV.
3. Administratively limit the beam intensity remain below 5E12 (current=2 mA, pulse length 400 micro-sec, repletion rate 1 Hz)
4. Establish 10 MeV bean at tank 9 beam stop.
5. Set the LTB line for the 10 MeV kinetic energy

6. Before opening the LTB beam stops, record LTB loss monitors. Record radiation levels from Chipmunks NM112. Record radiation level at the position of these Chipmunks with the HP1010 meter.
7. With RCD personals monitoring levels on the linac side of the EBIS-Booster penetration, open the LTB beam stops and establish low intensity proton beam to vacuum valve (ltb-sv-076).
8. Before establishing the fault condition, adjust the linac width to establish the desire intensity for the fault study. Record LTB beam current transformer traces. (The beam current transformers in the LTB line are XFMR011 and XFMR100)
9. Insert LTB vacuum valve ltb-sv-076. Record levels from Chipmunk NM112. Record levels at the position of this chipmunk with the HP1010 meter.
10. Use D2 to D5 magnet to produce beam loss bear the cross over between LTB and ETB. Record level at the positions of these Chipmunks with HP1010 meter.
11. Use Horizontal steerer (DH76) about 91 cm upstream of the cross over between LTB and ETB. Record level at the positions of these Chipmunks with HP1010 meter.

1.4 Survey Locations

Figure 1 shows the region on the ground floor of the Linac building bear EBIS-Booster Penetration pipe opening. The Blue rectangle labeled A and B show the position of chipmunk B (NM112). Chipmunk NM112 set to alarm at 2.0 and interlock at 2.5 mrem/hours.

The survey locations are:

1. On the ground floor of Linac building bear the chipmunks shown in figure 1
2. If any radiation detectable on the ground floor then only: On the second floor of the linac building just above the place where the EBIS-Booster penetration pipe comes through the wall.

All survey is to be conducted with the HP1010 meter unless otherwise noted.

1.5 Radiation Estimate

Kin Yip [1] has estimated the dose rate at end of the EBIS-Booster penetration pipe in the linac building. Many tallies give zero but only detectors, using variational methods give non-zero stuff with ~11% error after 100 million events, it is about 3.2E-21 per proton at 10.5 MeV, with 1E11 proton/s one will have about 1 micro-rem/hours.

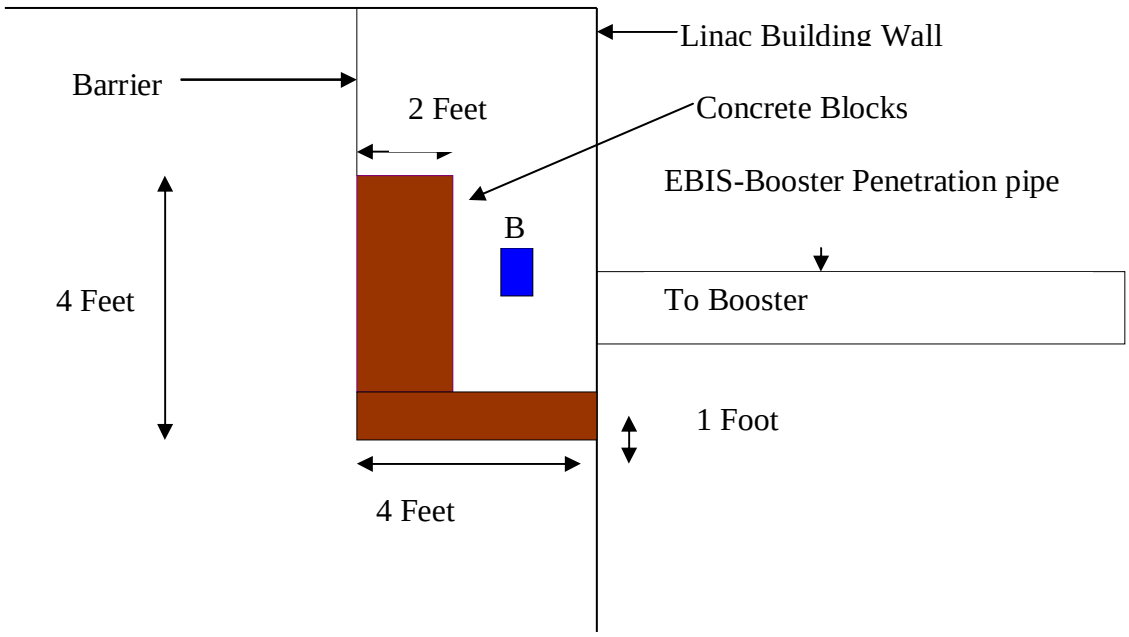

Figure 1: Region on the ground floor of the Linac building bear EBIS-Booster Penetration pipe opening. The Blue rectangle labeled B show the position of chipmunk B (NM112). Chipmunk NM112 is set to alarm at 2.0 and interlock at 2.5 mrem/hours.

References

[1] private communication